



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/769,936

02/02/2004

Vlasta Brusic

100172

9573

29050

7590

04/06/2007

STEVEN WESEMAN

ASSOCIATE GENERAL COUNSEL, I.P.

CABOT MICROELECTRONICS CORPORATION

870 NORTH COMMONS DRIVE

AURORA, IL 60504

EXAMINER

SMITH, NICHOLAS A

ART UNIT

PAPER NUMBER

1742

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
--	-----------	---------------

3 MONTHS

04/06/2007

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

**Office Action Summary**

Application No.

10/769,936

Applicant(s)

BRUSIC ET AL.

Examiner

Nicholas A. Smith

Art Unit

1742

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 26 January 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-27 is/are pending in the application.
- 4a) Of the above claim(s) 10-22 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1, 2, 4-9, 23, 24, 26 and 27 is/are rejected.
- 7) ☒ Claim(s) 3 and 25 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date 2/2/04, 5/1/06.

- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Election/Restrictions***

1. Applicant's election without traverse of Group I, claims 1-9 and 23-27 in the reply filed on 26 January 2007 is acknowledged.

### **Status of Claims**

2. Claims 1-9 and 23-27 remain for examination. Claims 10-22 are withdrawn from consideration.

### ***Claim Rejections - 35 USC § 102***

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1-2, 7, 9 and 23-24 are rejected under 35 U.S.C. 102(b) as being anticipated by Aberg, "Measurement of Uncompensated Resistance and Double Layer Capacitance during the Course of a Dynamic Measurement: Correction for IR Drop and Charging Currents in Arbitrary Voltammetric Techniques," *Journal of Electroanalytical Chemistry* **419** (1996) pp. 99-103 as submitted on 1 May 2006 in Applicant's Information Disclosure Statement.
5. In regards to claim(s) 1, Aberg discloses a method of IR correction in an electrochemical cell, within an electrolyte, at least a working electrode, a counter electrode, and a reference electrode adjacent to the working electrode (p. 101), comprising measuring a voltage transient between the reference electrode and the

Art Unit: 1742

working electrode resulting from application of a substantially square step function test signal to the electrochemical cell (pp. 100-101), deriving from the voltage transient a measure of the resistive impedance of the electrochemical circuit between and including the working electrode and the reference electrode (p. 100), and subsequently using the measure of resistive impedance to derive an IR correction to the measured voltage between the working electrode and the reference electrode (p. 100). In regards to claim limitation "in an ECMP cell," this limitation is considered intended use and there is no active step or structure differentiating the claimed invention from an electrochemical cell and therefore the limitation is given no patentable weight. See MPEP 2112.

6. In regards to claim(s) 2, Aberg discloses a method comprising using the IR correction to produce a corrected voltage that represents the voltage across a substantially capacitive interface between the working electrode and the electrolyte (p. 100).

7. In regards to claim(s) 7 and 9, Aberg discloses the step of measuring a voltage transient between the reference electrode and the working electrode comprises measuring the voltage between the reference electrode and the working electrode prior to, during, and after the transient and such measurements are taken at substantially the same resolution (p. 101).

8. In regards to claim(s) 23, Aberg discloses a method of IR correction for use in an electrochemical cell having, within an electrolyte, at least a working electrode, a counter electrode, and a reference electrode adjacent to the working electrode (p. 101), comprising applying a substantially square step function test signal to the

Art Unit: 1742

electrochemical cell (p.101), measuring a voltage transient between the reference electrode and the working electrode resulting from the application of the test signal the test signal having a start point, wherein the measurement of the voltage transient comprises measuring the voltage between the reference electrode and the working electrode at three times prior to the test signal start point and at three times subsequent to the test signal start point (p. 100-101 and Fig. 1), deriving an extrapolated time-based voltage curve based on the measurements taken subsequent to the test signal start point (p. 100), deriving from the time-based voltage curve a measure of the resistive impedance of the electrochemical cell circuit between and including the working electrode and the reference electrode (p. 100) and subsequently using the measure of resistive impedance to derive an IR correction to the measured voltage between the working electrode and the reference electrode (p. 100).

9. In regards to claim(s) 24, Aberg is applied to the claims for the same reasons as stated above in paragraph 6.

10. Claims 1-2, 4, 7, 9 and 23-24 are rejected under 35 U.S.C. 102(b) as being anticipated by Champagne et al. (US 5,980,708) as submitted on 1 May 2006 in

Applicant's Information Disclosure Statement

11. In regards to claim(s) 1, Champagne et al. discloses a method of IR correction in an electrochemical cell, within an electrolyte, at least a working electrode, a counter electrode, and a reference electrode adjacent to the working electrode, comprising measuring a voltage transient between the reference electrode and the working electrode resulting from application of a substantially square step function test signal to

Art Unit: 1742

the electrochemical cell, deriving from the voltage transient a measure of the resistive impedance of the electrochemical circuit between and including the working electrode and the reference electrode, and subsequently using the measure of resistive impedance to derive an IR correction to the measured voltage between the working electrode and the reference electrode (col. 4, line 18 to col. 8, line 29, Figures 1, 16a-e). In regards to claim limitation "in an ECMP cell," this limitation is considered intended use and there is no active step or structure differentiating the claimed invention from an electrochemical cell and therefore the limitation is given no patentable weight. See MPEP 2112.

12. In regards to claim(s) 2, Champagne et al. discloses a method comprising using the IR correction to produce a corrected voltage that represents the voltage across a substantially capacitive interface between the working electrode and the electrolyte (col. 4, line 18 to col. 8, line 29).

13. In regards to claim(s) 4, Champagne et al. discloses converting the voltage transient to a digital representation thereof and deriving from the digital representation a measure of the resistive impedance of the cell (col. 4, line 18 to col. 8, line 29, Figure 1).

14. In regards to claim(s) 7 and 9, Champagne et al. discloses the step of measuring a voltage transient between the reference electrode and the working electrode comprises measuring the voltage between the reference electrode and the working electrode prior to, during, and after the transient and such measurements are taken at substantially the same resolution (col. 4, line 18 to col. 8, line 29, Figures 1, 16a-e).

Art Unit: 1742

15. In regards to claim(s) 23, Champagne et al. discloses a method of IR correction for use in an electrochemical cell having, within an electrolyte, at least a working electrode, a counter electrode, and a reference electrode adjacent to the working electrode, comprising applying a substantially square step function test signal to the electrochemical cell, measuring a voltage transient between the reference electrode and the working electrode resulting from the application of the test signal the test signal having a start point, wherein the measurement of the voltage transient comprises measuring the voltage between the reference electrode and the working electrode at three times prior to the test signal start point and at three times subsequent to the test signal start point, deriving an extrapolated time-based voltage curve based on the measurements taken subsequent to the test signal start point, deriving from the time-based voltage curve a measure of the resistive impedance of the electrochemical cell circuit between and including the working electrode and the reference electrode and subsequently using the measure of resistive impedance to derive an IR correction to the measured voltage between the working electrode and the reference electrode (col. 4, line 18 to col. 8, line 29, Figures 1, 16a-e).

16. In regards to claim(s) 24, Champagne et al. is applied to the claims for the same reasons as stated above in paragraph 12.

***Claim Rejections - 35 USC § 103***

17. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

18. Claims 5-6 and 26-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aberg or Champagne et al. as applied to claims 2 or 24 stated above, and in view of Weihs et al. (US 6,171,467) as submitted on 2 February 2004 in Applicant's Information Disclosure Statement.

19. In regards to claim(s) 5-6 and 26-27, Aberg or Champagne et al. does not specifically disclose an active step of controlling the voltage across the substantially capacitive interface to within a substantially small variance from a predetermined value.

20. Weihs et al. discloses a electrochemical polishing system. Weihs et al. teaches that controlled voltage allows growth of a layer (col. 3, lines 24-48), It would have been obvious to one of ordinary skill in the art to modify Aberg's or Champagne et al.'s method with Weihs et al.'s control of voltage in order to allow growth of a layer (Weihs et al., col. 3, lines 24-48). While Weihs et al. does not specifically disclose the variance at which the voltage is controlled, It would have been obvious to one of ordinary skill in the art to acknowledge that one would want to keep a constant value as much as is possible to for film/layer uniformity. "Small" is only a relative term and thus would not distinguish from the art in any patentable manner. Furthermore, in regards to claim(s) 6 and 27, it would have been obvious to one of ordinary skill in the art to control the voltage as tightly as possible in Aberg or Champagne et al. in view of Weihs et al.'s method and thus meet the claimed limitation.

21. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Aberg or Champagne et al. as applied to claim 7 stated above, and in view of (no reference).



Art Unit: 1742

22. Aberg or Champagne et al. does not specifically disclose making measurements with different temporal resolution before or after a square step, however, it would have been obvious to one of ordinary skill in the art to have a higher scan rates during the "active" portion of the electrochemical process, in that, the prior to and after portions would serve as a baseline.

### ***Allowable Subject Matter***

23. Claims 3 and 25 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

24. The following is a statement of reasons for the indication of allowable subject matter: Claims 3 and 25 are indicated allowable because prior art do not suggest, teach or disclose a method wherein a potentiostat in an IR correction method would have its output modified by a current limiter while applying a small square step function voltage perturbation to the potentiostat input. It is noted that Yarlinsky (US 3,838,032) discloses a Zener diode acting as a current limiter, however, Yarlinsky's system does not even include a reference electrode to distinguish the capacitive interface.

### ***Conclusion***

25. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Bruckenstein et al. (US 5,180,968) discloses control of an electrochemical cell while compensating for double layer. Schuster et al. (US 6,689,269) discloses ) discloses control of an electrochemical cell while compensating for double layer.

Art Unit: 1742

26. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nicholas A. Smith whose telephone number is (571)-272-8760. The examiner can normally be reached on 8:30 AM to 5:00 PM, Monday through Friday.

27. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy King can be reached on (571)-272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

28. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

NAS

  
ROY KING  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 1700